

METHOD OF KICK DETECTION AND CUTTINGS BED BUILDUP DETECTION USING A DRILLING TOOL

Abstract

[00177] A method comprising determining a characteristic of a mud mixture surrounding a drilling tool within an inclined borehole in which a drilling tool is conveyed. The method includes defining a cross-section of the tool which is orthogonal to a longitudinal axis of the tool. A bottom contact point of the cross-section of the tool is determined, which contacts the inclined borehole as the tool rotates in the borehole. The cross-section is separated into at least two segments, where one of the segments is called a bottom segment of the borehole which includes the bottom contact point of the cross-section of the tool with the inclined borehole. The tool is turned in the borehole. Energy is applied into the borehole from an energy source disposed in the tool, as the tool is turning in the borehole. Measurement signals are received at a sensor disposed in the tool from circumferentially spaced locations around the borehole, where the measurement signals are in response to returning energy which results from the interaction of the applied energy with the mud mixture and the formation. The measurement signals are associated with a particular segment during the time such signals are produced in response to energy returning from the mud mixture and the formation as the tool is turning in the borehole. An indication of a characteristic of the mud mixture is derived as a function of the measurement signals associated with a plurality of the at least two segments of the borehole. The indications of a characteristic of the mud mixture for the plurality of segments are compared with at least one of each other and a known indication of a characteristic of the mud mixture.